Sleep Breath (2005) 9: 57–63
DOI 10.1007/s11325-005-0016-z

ORIGINAL ARTICLE

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Sleep problems and the risk for sleep disorders in an outpatient veteran population

Published online: 5 May 2005

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Abstract We used a self-report questionnaire to identify outpatients with chronic symptoms of sleep disorders and/or high pretest probability for sleep apnea as well as for restless legs syndrome (RLS), insomnia, and narcolepsy. Surveys were presented to patients waiting for an appointment in Veterans Administration (VA) Medical Center clinics in Northeast Ohio, USA. Items addressed the frequency of snoring behavior; wake time sleepiness or fatigue and history of obesity/hypertension for high risk for sleep apnea (Netzer et al. 1999), along with other symptoms, were scored as positive vs negative risk for insomnia, narcolepsy, and RLS. Of the patients offered the surveys, 886 (59.2%) provided timely responses to the questionnaire. Mean age was 62.5 years (range, 19 to 85 years); 95% were males; mean body mass index was 29.3 kg/cm^2 (range, 15.1 to 57.5 kg/cm^2); and mean Epworth Sleepiness Scale score was 8.3 (range, 1 to 22) with 4.6% having a score >17. Of the respondents, 47.4% met high-risk criteria for sleep apnea, 41.7% for insomnia, 19% for restless leg syndrome, and 4.7% for narcolepsy. Twenty-four percent reported use of sleeping pills or bedtime alcohol. Drowsy driving >3–4 days a week or every day was reported in 5.7%. VA primary care patients have high prevalence for pretest probability for sleep apnea. This population also reports chronic symptoms for other sleep disorders and for drowsy driving.

Keywords Sleep apnea · Questionnaire · Snoring · Hypertension · Restless legs syndrome · Excessive daytime sleepiness · Alcohol · Sleeping pills · Drowsy driving

Introduction

In the United States and Europe, the prevalence of risk factors for sleep apnea in primary care offices is three- to four fold higher than in the community, and clinically significant illness often goes unrecognized [1, 2]. Furthermore, excessive sleepiness as a proximate cause not only of personal accidents and workplace problems, but also of car crashes, is a health hazard [3, 4]. Such sleepiness is more often present in chronic medical disorders [5, 6] and may promote by itself increased health care costs [1]. Reductions in sleepiness either by advocating sleep extension or recognizing a sleep disorder will reduce these adverse events and also increase a sense of wellness [5, 7].

The Department of Veterans Administration (VA) Health Service provides care to a predominantly male and middle-aged population with a high prevalence of obesity, diabetes, hypertension, and psychiatric disease [8]. These conditions have known associations to sleep disorders and sleep apnea in particular [5]. Yet, there is a paucity of information regarding sleep apnea or other sleep disorders specific to this patient population. One VA-based study examined the prevalence of sleep complaints (insomnia or excessive daytime sleepiness) in a group of medical in-

patients; in a structured independent interview, major symptoms were reported in 47% of patients, but none were recognized by the physicians of record [9]. In a second study based in a VA mental health outpatient clinic, an active search for insomnia revealed that it was common, and identification and treatment linked to improved outcome [10]. Lacking is a general survey of sleep symptoms in VA primary care populations, a survey that would provide a more global view of sleep disorders and the magnitude of problems.

The purpose of this survey was to utilize a patient-based instrument (Cleveland Sleep Habits Questionnaire [11]) as a means for detecting the proportion of VA outpatients with excessive daytime sleepiness and/or with a high or low probability for sleep apnea, restless legs syndrome (RLS), narcolepsy, and insomnia.

Methods

Primary study The clinic outpatient study was approved as an anonymous survey by the Institutional Review Board of the Louis Stokes Cleveland DVA Medical Center, Cleveland, OH. Surveys (see below) were handed out to patients in the waiting areas of four primary care clinics and one referral cardiology clinic. The staff was instructed to return any forms to the sleep center. Collection of data occurred over a 2-month period at each site, from June 2001 to March 2002.

The instrument (Cleveland Sleep Habits Questionnaire, iONSLEEP LLC, Shaker Heights, OH) is a patient self-report tool, to be used as an entry into a process for medical decision making. One section of the instrument incorporates questions from the Berlin Questionnaire, with a known verification of the sensitivity and specificity of the probability of finding increased apneic activity on a sleep study [12]. The Berlin Questionnaire addresses known risk factors for sleep apnea including snoring history (five questions), tiredness (four questions), and history of high blood pressure and/or body mass index (BMI) >30. Patients were asked for information concerning age, weight, height, gender, and race. Obesity was quantified by BMI, as calculated from self-reported weight and height, expressed as kilograms per square meter (kg/m^2). The determination of a "high" and "lower" probability was based on the chronic nature and severity of several reported symptoms and traits, as previously published [12]. The three categories were snoring, daytime sleepiness/fatigue, and BMI >30/high blood pressure. To have a "high pretest probability," a person would have two of four questions about snoring (category 1) that indicated persistence ("more than three to four times a week" or "every day" snoring; "louder than talking" or "heard in the next room" snoring; and/or "more than three to four times a week" or "every day" breathing pauses during sleep) and persistent symptoms in two or more questions about wake time sleepiness and/or drowsy driving (category 2), *or* persistent symptoms resulting in a positive category 1 or category 2 and at least one feature or a history of high blood pressure or BMI >30 (category 3). In other words, a questionnaire had to have two of the three categories positive to be considered as indicating a high pretest probability for obstructive sleep apnea hypopnea syndrome (OSAHS) [2, 12]. Respondents who denied chronic symptoms or had chronic symptoms or signs in only one category were placed in the "lower pretest probability" or low-risk group.

Additional questions probed for persistent symptoms of insomnia (three questions), the use of drugs or alcohol to promote sleep, use of medications to treat hypertension (one question), smoking history (one question), leg jerks during sleep (one question), strange sensations in the legs (one question), and drop attacks or sudden weakness with surprise, anger, or laughter (one question) [11]. The scoring for these questions in regard to high pretest probability was based on *persistent* presence of these problems by the patient having checked off ">3–4 days a week" or "every day (night)." High probability for insomnia was based on persistent symptoms in two of the three questions; high pretest probability for restless legs syndrome was based on persistent report of both leg jerks during sleep and leg sensations and a positive score in category 2 (sleepiness); and high pretest probability for narcolepsy was based on the reported persistence of drop attacks and a positive score in category 2 (sleepiness). In summary, the questionnaire is a tool to collect responses in standard manner relevant to four clinical disorders of sleep: obstructive sleep apnea, insomnia, restless legs syndrome, or narcolepsy.

Two additional features of the questionnaire asked about functional sleepiness. One question was in the format as other symptom questions and of particular interest was a repost of "nodding off or sleeping at work >3–4 days a week" or "every day." The second was the Epworth Sleepiness Scale (ESS), a questionnaire containing eight items that asks for self-reported disclosure of the expectation of dozing in a variety of situations [13, 14]. Chances of dozing are rated on a scale of zero (0), slight (1), moderate (2), or high (3).

Patients also completed a checklist for known diseases, such as hypertension, diabetes mellitus, insomnia, congestive heart failure, hypothyroidism, asthma, chronic obstructive pulmonary disease, depression, posttraumatic stress disorder, sleep apnea, and a write-in category for other. Restless legs and narcolepsy were not listed as choices. Patients could check all that applied and also could write in a diagnosis.

Reliability study Reliability issues for the questionnaire were addressed by separate substudies performed in three different convenience samples. The reliability studies were approved by the Institutional Review Board of the Louis Stokes DVA Medical Center, Cleveland OH. In these studies, the patients were recruited from specialty clinics

as they appeared for treatment or consultation in the Sleep Clinic or in outpatient clinics. Data from these two substudies were not used in the analysis of the anonymous survey.

Data entry and statistical evaluations Quantitative distributions of returned questionnaires, individual patient parameters, answers to single questions according to sleep-related symptoms, and grouping according to high probability of a sleep disorder are expressed by descriptive statistics (frequencies, mean, standard deviation, and range). Missing data are expressed in the percentage of the returned questionnaires and in total number for each parameter. Correlation between self-reported symptoms and risk categories was done by bivariate analysis using chi-square methods. Descriptive statistics and models of analysis were developed using SPSS 10.0 for Windows (SPSS, Inc., Chicago, IL).

Results

Primary study Many (n=1496) individuals were approached for this survey; 34% refused the opportunity and 5% more were unable to complete the survey for various reasons, with blindness being the most common followed by illiteracy. Some 886 (59.2%) questionnaires met criteria for timeliness. A subset of those timely returns (n=51) were incomplete in regard to one or two questions on the risk stratification survey, but because these questionnaires were otherwise suitable for risk categorization, data were included. Therefore, 886 encounters composed the data set for analysis. Ninety-five percent of the entered respondents were male, precluding gender analyses, so results were combined. Respondents to the question indicated their race as white (67.2%), black (24.6%), Hispanic (3.6%), or other (4.6%). The respondents represented approximately 1.3% of the unique Social Security numbers in this Northeast Ohio VA medical center.

The mean age was 62.5 years (range, 19–85 years), and values were similar across all sites. The prevalence of self-reported current chronic illnesses is shown in Fig. 1. As is reported for this population [8], there is a high rate of cardiovascular and mood disorders. Significant (>5%) proportions reported having sleep apnea and/or insomnia as a chronic illness. A diagnosis of asthma, chronic obstructive lung disease, and/or posttraumatic stress disorder was reported in <5% of the respondents.

Data regarding the Epworth Sleepiness Scale were unavailable or incomplete on 83 patients (~10%). In the remaining responses, there was a wide range of scores for ESS (Fig. 2); values were normally distributed, with a mean value of 8.3 (range, 0–24). A substantial proportion (68.1%) of patients reported scores that were in the reported normal range (ESS <11), 18% reported scores between values of 12 and 17, and a small percentage (4.6%) reported pathological sleepiness (ESS >17).

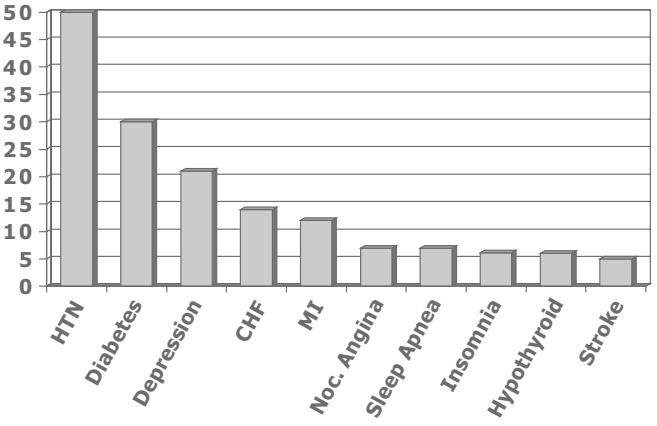

Fig. 1 The *bars* represent the frequency (%) of self-reported medical disorders in the patient population. Only conditions with a frequency >5% are shown. *HTN* Hypertension, *CHF* congestive heart failure, *MI* myocardial infarction

Category 1 Among all respondents, 508 (57%) reported that they snored; 230 (26%) denied snoring, and 134 (15%) did not know if they snored. Fifty-five (6%) of the respondents reported their snoring as louder than normal speech. Two hundred twenty-six (30%) reported snoring every day; 91 (10.3%) snorers reported they snored at least three to four times per week; 389 (43.9%) snorers reported that their snoring bothered other people. In 76 (8.6%) of all respondents, breathing pauses during sleep were observed by others, more than three to four nights a week; 394 (44.5%) respondents were positive on category 1.

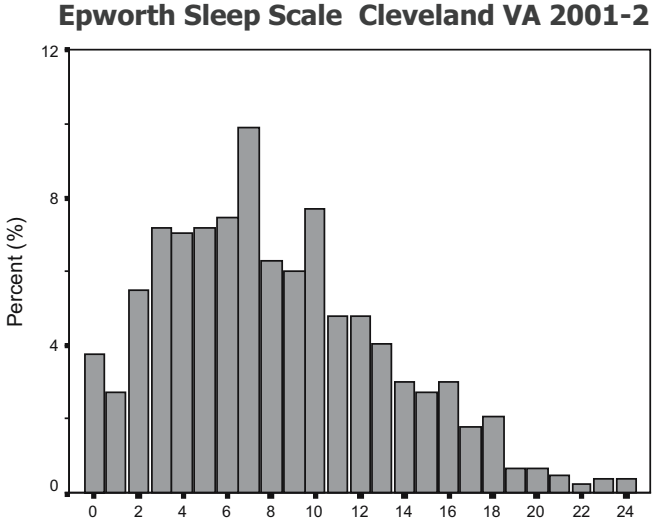

Fig. 2 Shown is the distribution of scores in those who completed the Epworth Sleepiness Scale (ESS); this distribution meets criteria for a normal distribution

Category 2 Some 232 (26.2%) of all respondents stated that they felt rested after a night's sleep at least three to four times per week; the remainder did not. Some 276 (31.2%) admitted wake time tiredness/fatigue nearly every day. Some 180 (20.3%) of respondents to the question about sleepiness on the wheel admitted that they had nodded off at the wheel or fallen asleep while driving. Nineteen (3%) of those responding to the drowsy driving question reported sleepiness at the wheel at least three to four times per week and another 17 (2.7%) reported doing so once or twice a week. Some 377 (42.6%) scored positive for reporting persistent wake time sleepiness/fatigue or category 2.

Category 3 The mean BMI was 29.3 kg/m^2 (range, 15.1–57.5), and 327 (36.9%) of patients had a BMI >30. Four hundred forty (49.7%) reported a history of high blood pressure; 421 (47.5%) did not know if their blood pressure was high or normal; 35 (4%) did not answer the question. Five hundred seventy-one (64.4%) scored positive in category 3.

For the entire group, 420 (47.4%) met criteria for high risk for sleep apnea, using the Berlin Questionnaire criteria [19]. Using the criteria to assess risk for other sleep disorders, there were 359 (41%) for insomnia, 166 (19%) restless legs syndrome, and 41 (4.7%) for narcolepsy. Among sites, values for age and ESS were not different. There was a difference among sites in the prevalence of those positive for all three categories with the range for category 1 of 34.2 to 55.4%, for category 2 of 23 to 73.2%, and for category 3 of 60.6 to 70.5%. The prevalence for those meeting the Berlin criteria for high risk of sleep apnea was also different among sties (range, 41.2 to 67.9%). For the other sleep disorder risk categories only restless legs risk differed among sites with one site reporting a prevalence of 48.2% and all others between 6.6 and 19.7%. There was one clinic unique in that it had the highest prevalence for categories 1, 2, and 3, as well as for sleep apnea, insomnia, and restless legs syndrome risk. This outlying clinic also returned questionnaires from younger veterans and distribution of questionnaires was the least even in regard to return time. When data from the 56 individuals from this clinic were excluded from analysis, however, no significant differences were noted when compared with the remaining data set.

Given the prevalence of obesity, the risk for a given sleep disorder was explored using a BMI threshold of 30 (Table 1). In this analysis, only the traits of category 1 and 2 were used to calculate risk for sleep apnea, as obesity is a criterion for category 3. Category 2 and the sleep apnea and the RLS "high-risk" prevalence were significantly different according to this dichotomous BMI stratification. Snoring, insomnia, narcolepsy, and the use of pills and/or alcohol for sleep were not.

Sleepiness was a factor included in more than one risk category, and hence respondents could be placed into more than one category. Symptom criteria for both sleep apnea and insomnia risk were the most common, followed by sleep apnea with restless legs syndrome and by insomnia with restless legs syndrome (Fig. 3). Some 429 (49%) met risk criteria for more than one sleep disorder, whereas 103 (12%) met criteria for three sleep disorders. Very few were placed in both narcolepsy and sleep apnea risk groups or reported symptom criteria for all four disorders.

Table 1 Effect of obesity on risk of sleep disorders and problems

	BMI <30	BMI >30
Category 1 (snoring) positive	39.8	58
Category 2 (sleepiness) positive	39.1	51.9*
Category 1 and category 2 positive	27.5	43.3*
Insomnia	38.6	45.6
Restless legs syndrome	16.4	23.2*
Narcolepsy	5	4.7
Using alcohol/pills to sleep	16.4	24.2

BMI body mass index (kg/m^2)
*P=0.05 or better

Shown in Table 2 are correlations among selected symptom categories and sleep disorder risk. There is a statistically significant correlation among categories, BMI >30, ESS scores, and risk for sleep apnea. Categories, BMI >30, and ESS also correlated with insomnia. Risk for restless legs syndrome correlated with categories 1, 2, and 3 and with ESS, whereas narcolepsy was correlated with categories 1 and 2 and with ESS.

In regard to the question about sleepiness at work, 7.1% reported sleepiness or "nodding off" three to four times a week or every day. Bivariate analysis showed that there was a high degree of correlation between drowsy driving and nodding off to sleep at work (P<0.001). There was also a high degree of correlation between ESS and both drowsy driving (P<0.01) and falling asleep at work (P<0.01).

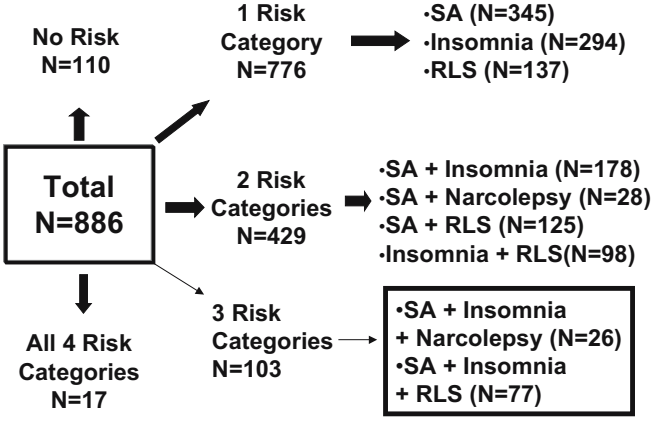

Fig. 3 Patients meeting risk criteria for one or more of the four different sleep disorders are shown in the *boxes*. *SA* Sleep apnea high risk for Obstructive Sleep Apnea Hypopnea Syndrome (OSAHS), *RLS* restless legs syndrome

Table 2 Correlations among symptom categories with sleep disorders

	Sleep apnea risk	Insomnia	Restless legs risk	Narcolepsy
Category 1	0.786**	0.156**	0.269**	0.126**
	0.001	0.001	0.001	0.001
Category 2	0.740**	0.278**	0.528**	0.133**
	0.001	0.001	0.001	0.001
Category 3	0.343**	0.025	0.069*	0.041
	0.001	0.034	0.005	0.230
BMI >30	0.129**	0.074*	0.062	0.004
	0.001	0.034	0.074	0.902
ESS	0.291**	0.232**	0.281**	0.141**
	0.001	0.001	0.001	0.001

*Significant at the 0.05 level (two-tailed); **significant at the 0.01 level (two-tailed)

Reliability study In a separate study and with patient data not included in the anonymous survey results, we reviewed the charts of a group of 120 patients presenting for evaluation to the sleep clinic and who had filled out the survey as part of a referral from primary care clinics. The self-report was examined for answers that could be verified independently by chart review. Responses were verified for age (99% within 1 year of the birth date found in the chart), BMI (range, 26–44 kg/m^2; 99% within 2 units and none that altered the risk by category 3), and hypertension (92% correlation between the self-report and chart verification). The checklist report of "Medical Disorders" showed the correlation of self-report to the chart for congestive heart failure (85%) and diabetes (87%).

The self-report from the primary care referral was also compared to the Sleep Clinic visit. This included patients at high risk for insomnia (n=32), restless legs syndrome (n=16), or narcolepsy (n=7), with or without a high risk for OSA. Upon interview, all patients with insomnia were identified as having problems in the initiation and maintenance of sleep. A presumptive diagnosis of a circadian rhythm disturbance was made in one patient, and the remainder was identified as having insomnia either on the basis of sleep apnea (n=24) or medical or neurologic conditions or treatment (n=7). Of those at high risk for RLS, 6 of 16 (37.5%) met criteria based on symptoms being relieved by movement or standing, proper circadian timing of symptoms, and a severity score of moderate; the remaining patients did not meet criteria or were considered to have diabetes, claudication, chronic obstructive pulmonary disease (COPD), or heart failure. Narcolepsy risk was assessed in 7 patients and subsequent questioning did not reveal convincing evidence for cataplexy in 6 (85% false risk); the most common problem in the false-positive narcolepsy risk self-report was congestive heart failure. Only one patient had clinically confirmed features of narcolepsy and subsequent diagnostic studies confirmed the presence of sleep-onset rapid eye movement sleep in three of five naps during the day.

In 20 individuals attending VA outpatient clinics, we found scheduled return visits within a time frame of 2–4 weeks and approached these patients on the second visit. In all those who retook the questionnaire, in no individual was there a change in classification based on self-reported height or weight, or composite risk for sleep apnea, insomnia, narcolepsy, or restless legs syndrome.

Discussion

This is the first report of prevalence estimates in a VA primary care population for symptoms indicative of sleep problems and possible disorders. Sleepiness is present to a significant degree and, as might be expected, the prevalence of self-reported snoring and risk factors (BMI >30 and/or hypertension) for sleep apnea is very high. Many have a pattern of symptom reports that make them candidates for clinical management of obstructive sleep apnea and insomnia or additional assessment for conditions of restless legs syndrome and/or narcolepsy.

The prevalence of symptoms for sleepiness, snoring, and composite risk for sleep apnea is consistently higher not only in the general population but also in comparison with other patient groups. When compared with other surveys in nonveteran populations that used essentially the same format and self-report form [2, 11, 12], the VA population is highest in the category 1 (snoring) and as high as that found in a university-based heart failure clinic in regard to prevalence of sleepiness, category 3, and composite risk for OSA. It may be that the gender and age of the VA patient population and the enriched profile of comorbidity are responsible for such high rates (Fig. 4).

In Seftel et al. [11], symptoms were elicited not only for risk stratification for OSA but also for insomnia, restless

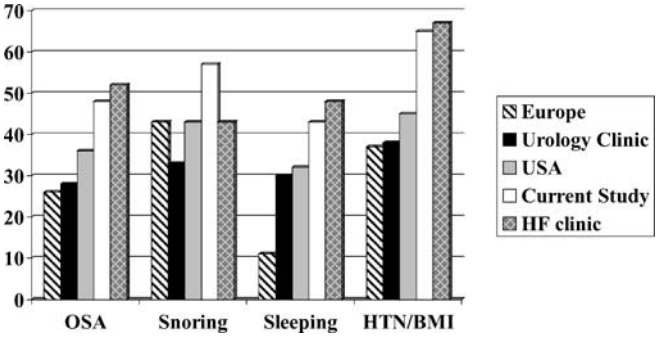

Fig. 4 Four previous studies have used the Berlin questions and criteria to stratify for risk of OSAHS. Shown are comparison of obstructive sleep apnea (*OSA*) risk, snoring, sleepiness, and hypertension (*HTN*)/BMI >30 among these studies. The European and USA data are from Netzer et al. [2], the Urology Clinic data is from Seftel et al. [11], and the heart failure (*HF*) clinic dataset is as yet unpublished (Karem Principe-Rodriguez, with permission)

legs syndrome, and narcolepsy in a nonveteran population of patients referred for evaluation of erectile dysfunction [11]. The prevalence of high risk for insomnia (13.6%) and for restless legs syndrome or narcolepsy (2% each) are much lower than what was found in the present sample.

The prevalence of high probability for restless legs syndrome was higher in this VA group (19.4%) than the 5.5% reported in a telephone survey performed in Europe [15]. Increased complaints of symptoms suggestive of RLS in this VA patient population could be due to multiple factors, as well as medical conditions like renal failure or anemia that have been associated with an increased prevalence of RLS.

Approximately 40% of the patients who completed the survey reported symptoms suggestive of insomnia. This is a much higher prevalence of the symptoms suggestive of insomnia than that observed in the general population [16], but more like that in a VA mental health clinic [10]. It is expected that mood disorders are more common in the VA patient population, but we observed a strong correlation between mood disorders (depression) and risks for both sleep apnea and RLS. This could be because many sleep disorders share symptoms of insomnia with mood disorders or that other sleep disorders are also enriched in mood disorders clinics.

Drowsy driving every day or three to four times a week was reported by 5.7%. This description is similar to reported estimates for a US primary care population [2]. However, there is a report of an ~25% prevalence of fall-asleep car crashes in medical patients admitted to a VA hospital [9]. Differences between this study and the present one in regard to the report of drowsy driving may be explained by the venue and/or the severity of chronic illness. In either setting, the importance of identifying sleepiness may be not only for the safety of the veteran but also for their family and community [17–19]. Identification and treatment of sleep disorders appears to reduce the risk of motor vehicle crashes [20].

Reliability In a separate population, we examined the reliability of the self-report of certain selected variables (age, BMI, hypertension, etc.) and report a high degree of correlation between questionnaire responses and data derived from the charts. This finding gives us some confidence in the reliability of the self-report data.

We also tested the reproducibility of the self-report. Hence, the questionnaire, while having the advantage of simplicity, also results in reliable data for many demographic features and comorbid conditions. However, surveys that use a self-report format are not intended for diagnosis but are tools to help identify people at risk.

A patient-based questionnaire did not replace a personal clinical encounter or further diagnostic testing. Those few with a high pretest probability for all four sleep disorders result to some degree from symptoms shared by more than one sleep disorder, so that those physicians looking only for sleep apnea will encounter symptoms suggestive of other sleep disorders. There will be a need to critically evaluate the self-report before embarking on diagnostic testing.

In the group with a primary care questionnaire and a sleep clinic interview we were able to determine if a positive pretest possibility for insomnia, restless legs, or narcolepsy based on the self-report matched a diagnosis made by a semistructured clinical visit. Insomnia was often verified but also often encountered with other sleep disorders and medical conditions. Risk of RLS and narcolepsy required sleepiness in the definition. In the former, about a third of those met clinical criteria for RLS after features such as its unique symptom complex and circadian fluctuation were elicited by personal questioning. With clinical follow-up of a positive score for narcolepsy, follow-up questioning was largely inconclusive, without convincing descriptions for cataplexy, sleep paralysis, and/or hypnagogic hallucinations. Only one primary care referral that scored positive for narcolepsy was subsequently found to have the full disorder. Therefore, the risk of "narcolepsy" from a patient-based, self-report questionnaire such as this one is very unlikely to be narcolepsy.

The Epworth Sleepiness Scale, another subjective measure of daytime sleepiness, was in the normal range in a great majority (~70%). Five percent of the patients scored greater than 18 on the scale. ESS scores correlated with the degree to which patients complained of sleepiness in category 2 and may be a useful link between patient complaints and their objective findings on the Multiple Sleep Latency Test (MSLT) [21, 22]. There was a high degree of correlation between drowsy driving and falling asleep at work with ESS. For prediction of a specific sleep disorder or set of disorders, however, the ESS score had poor specificity.

Limitations This study was conducted in the VA health system, which serves a male, predominantly middle-aged, or older population in which multiple comorbid conditions are commonly present. This group will not represent a general primary care or a pediatric population. In addition, a significant portion of patients approached for the survey (34%) refused to complete the questionnaire. This introduces the possibility of bias, as only those patients who had sleep problems might have been interested to participate. Yet, we collected a reasonably large database and results changed very little from the midpoint to the end of the data collection period. The number of respondents represents a fraction served by this regional VA medical center, and the estimated margin of error is approximately ±2%. Yet estimates for a need for sleep assessment or discussions about sleepiness or insomnia are likely significant if all those who refused had no risk.

In summary, many VA primary care patients report symptoms with a high probability for sleep apnea, with an overall prevalence that is higher than that found in other

surveys. The VA population is also enriched for those with chronic symptoms for other sleep disorders (insomnia, restless legs syndrome, and narcolepsy) and perhaps for drowsy driving. Using a questionnaire based on self-report of symptoms could be a strategy to alert the primary care physician to possible risk for sleep disorders. Early identification and referral of such patients may prevent adverse health consequences of the untreated sleep disorder(s).

Acknowledgements The authors thank the people participating in this study. Jamie Blecher and Jonathan Watkins provided assistance in the collection of questionnaires and the assessment of patients. Dr. Karem Principe-Rodriguez provided advice and counsel. This work was supported in part by the Department of Veterans Affairs Research Service, a Sleep Academic Award (KPS-KO7 HL03650), and the Division of Pulmonary and Critical Care Medicine, University Hospitals of Cleveland. The Cleveland Sleep Habits Questionnaire is held in copyright by iONSLEEP LLC (Shaker Heights, OH) and is available for academic or investigational use at no cost.

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